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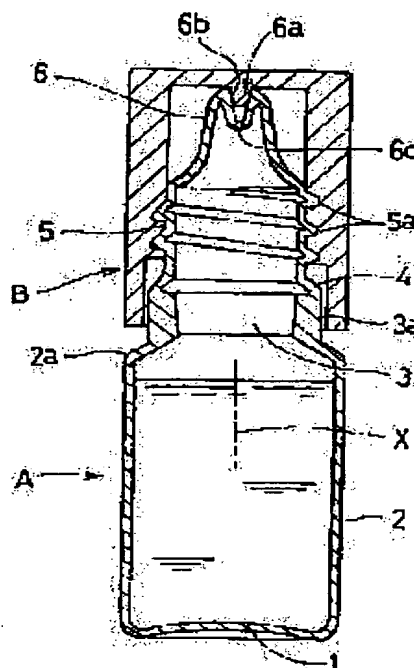
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(54) EYEDROPPER AND METHOD OF MANUFACTURING IT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an eyedropper which can always surely make a fixed quantity of liquid to drop down when its main body is pressed without detracting the advantage in manufacturing cost of its bottle pack type main body.

SOLUTION: At the front end section of the main body A of an eyedropper in which a liquid is simultaneously packed in a hermetically sealed state when the main body A is molded and which is made of a thermoplastic material, a bottomed conical recessed section 6b having an inside diameter which becomes larger as going toward the front end side is formed. In addition, a small-diameter liquid injection hole 6c is formed through the bottom of the recessed section 6b so as to control the quantity of a droplet squeezed out of the main body A to a set value.



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CLAIMS

[Claim(s)]

[Claim 1] The opening instillation container which has carried out penetration formation of the inlet of the minor diameter for controlling the amount of drops which a head side becomes depressed and forms the closed-end conic crevice where a bore serves as size in the point of the body of a container made from the thermoplastics with which the liquid is filled up into shaping and coincidence with the seal condition, and is extruded by the base of this crevice from the body of a container to a preset value.

[Claim 2] It is the opening instillation container which a head side became depressed and formed the closed-end conic crevice where a bore serves as size in the point of the body of a container made from the thermoplastics with which the liquid is filled up into shaping and coincidence with the seal condition, and is equipped with the configuration whose penetration formation on the base of said crevice is attained in the inlet of the minor diameter for controlling the amount of drops in which this hollow is extruded by the base of this crevice from the body of a container in that case to a preset value.

[Claim 3] The opening instillation container according to claim 1 or 2 with which the screw section for enabling screwing wearing of the desorption of a cap in the condition of sealing the crevice of this body of a container is really formed in said body of a container.

[Claim 4] The opening instillation container according to claim 1, 2, or 3 constituted by the range whose depth of said crevice is 2-7mm.

[Claim 5] the month by the side of the head of said crevice — the opening instillation container according to claim 1, 2, 3, or 4 constituted by the range whose path is 2-4mm.

[Claim 6] The manufacture approach of the opening instillation container which is the manufacture approach of an opening instillation container according to claim 1, 3, 4, or 5, carries out the pressure welding of the needlelike die which forms the convex die which fabricates said crevice, and said inlet, and fabricates it from a container axis to the point of the body of a container with which the liquid is filled up into shaping and coincidence with the seal condition.

[Claim 7] The manufacture approach of the opening instillation container which is the manufacture approach of an opening instillation container according to claim 2, carries out the pressure welding of the convex die which fabricates said crevice, and fabricates it from a container axis to the point of the body of a container with which the liquid is filled up into shaping and coincidence with the seal condition.

[Claim 8] The manufacture approach of an opening instillation container according to claim 6 or 7 of heating the part fabricated with said convex die at least to the temperature which is not buckled with a heating means before shaping.

[Claim 9] The manufacture approach of an opening instillation container according to claim 6 that said convex die and needlelike die fabricate a crevice and an inlet to the point of a container using the single die really formed.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to amelioration of the opening instillation container used for medical-application eye lotions, and the manufacture approach of that.

[0002]

[Description of the Prior Art] It is necessary to control the amount of instillation to a constant rate in medical-application eye lotions. As a common opening instillation container which can control this amount of instillation Inner fitting immobilization of the inside plug member of an injection-molded product is carried out at the tubed regio oralis of the fabricated body of a container. To this inside plug member While a head side forms the inlet of the minor diameter where a bore controls the amount of drops which penetrates in and abroad in the base center position of the closed-end conic crevice where it becomes size, and this crevice, and which extrudes from the body of a container What carried out screwing wearing of the cap of the injection-molded product which equipped the male screw section formed in the peripheral face of the tubed regio oralis of said body of a container with the plug-like projection for sealing the closed-end cone-like crevice of an inside plug member in the state of fitting is used widely.

[0003] When based on this opening instillation container, by existence with the inlet of the minor diameter by which penetration formation was carried out to the base center position of the closed-end conic crevice formed in the inside plug member, and this crevice The metal mold for injection molding three members of what can take to press actuation of the body of a container, and can always carry out dropping administration of the liquid of a constant rate certainly to each **, respectively is required, and washing / sterilization activity of each part material is needed, and a manufacturing cost becomes high.

[0004] On the other hand, the shaping container is really used considering the manufacturing cost as a container which may make lowering and the function as an opening instillation container hold. the body of a container made from thermoplastics (a common name —) with which it sets in this container, and blow molding or the vacuum forming, simultaneously the liquid are filled up with and enclosed The cap which has really formed the needlelike projection for carrying out penetration formation of the inlet in the point of the body of a container is screwed in the male screw section formed in the peripheral face by the side of a point among the bodies of a container of a bottle pack mold free [desorption]. The screwing actuation by the side of a bundle lump deeper one step than the usual closedown location of this cap constituted so that penetration formation of the inlet might be carried out by the needlelike projection of a cap at the point of the body of a container.

[0005]

[Problem(s) to be Solved by the Invention] Although it has the advantage which can attain cheap-ization of a manufacturing cost with the opening instillation container of an above-mentioned bottle pack mold as compared with the opening instillation container using the inside plug member which it injection molded If the screwing control input by the side of the bundle lump from the usual closedown location of a cap is not appropriately performed in order to form an inlet, breaking through the point of the body of a container by the needlelike projection of a

cap, the configuration and magnitude of an inlet may become uneven and fluctuation of the amount of drops extruded from the body of a container may be invited.

[0006] Moreover, if superfluous actuation of the cap is more nearly usually than a closedown location carried out at a bundle lump side after penetration formation of the inlet is carried out at the point of the body of a container, an inlet will be extended at every the superfluous bundle lump actuation of the by the needlelike projection of a cap, and the amount of drops extruded from the body of a container may increase gradually.

[0007] Therefore, although sufficient explanation about the operation of an opening instillation container was needed, since screwing actuation may have been suitably carried out to a bundle lump side, and a cap may have been punched or bundle lump actuation of the cap may have been superfluously carried out even if it compares and performs sufficient explanation, it was difficult [it] to avoid certainly the activity which made the mistake in being above.

[0008] In view of the above-mentioned actual condition, it succeeds in this invention. The 1st main technical problem Without spoiling a predominance in the manufacturing-cost side which is the advantage which the body of a container of a bottle pack mold has It is in the point of offering the opening instillation container which can take to press actuation of the body of a container, and can always carry out dropping administration of the liquid of a constant rate certainly, and the 2nd main technical problem is in the point of offering the manufacture approach which can promote cheap-ization of a manufacturing cost.

[0009]

[Means for Solving the Problem] The point which carried out penetration formation of the inlet of the minor diameter for control the amount of drops which becomes depressed , forms the closed-end conic crevice where a bore serves as size , and is extrude from the body of a container on the base of this crevice for a head side at a preset value has the description configuration of the opening instillation container by claim 1 of this invention at the point of the body of a container made from the thermoplastics with which the liquid is fill up into shaping and coincidence with the seal condition . According to the above-mentioned description configuration, the body of a container made from thermoplastics (body of a container of a bottle pack mold) with which the liquid is filled up into shaping and coincidence by blow molding, a vacuum forming, etc. with the seal condition is used. Although a head side forms in the point of this body of a container directly the inlet of the closed-end conic crevice which a bore becomes with size, and the minor diameter for controlling the amount of drops extruded from the body of a container at a preset value, therefore It can both take to press actuation of the body of a container by existence with a closed-end conic crevice and the inlet of a minor diameter as if there is little metal mold for manufacturing the body of a container as compared with the opening instillation container using the inside plug member which it injection molded and it ends, and dropping administration of the liquid of a constant rate can always be carried out certainly. Therefore, dropping administration of the liquid of a constant rate can always be carried out certainly, without spoiling a predominance in the manufacturing-cost side which is the advantage which the body of a container of a bottle pack mold has, since the closed-end conic crevice for making the point of the body of a container of a bottle pack mold demonstrate an inside plug function and the inlet of a minor diameter are only formed. A point especially important about the opening instillation container by this invention is forming a crevice with the configuration which can carry out penetration formation of the inlet of the minor diameter for controlling the amount of drops to a preset value in the point of the body of a container made from thermoplastics filled up into the liquid with the seal condition by shaping and coincidence. It is a thing also containing the opening instillation container as a semifinished product with which the crevice [like / so] was formed within the limit of this invention from this. The configuration of such an opening instillation container To the point of the body of a container made from the thermoplastics with which the liquid is filled up into shaping and coincidence with the seal condition so that it may indicate to claim 2 The head side became depressed and formed the closed-end conic crevice where a bore serves as size, and this hollow is equipped with the description of having the configuration whose penetration formation on the base of said crevice is attained in the inlet of the minor diameter for controlling the amount of drops extruded by the

base of this crevice from the body of a container to a preset value, in that case.

[0010] The point that the screw section for enabling screwing wearing of the desorption of the cap which seals the crevice of this body of a container on said body of a container is really formed has the description configuration of the opening instillation container by claim 3 of this invention. According to the above-mentioned description configuration, since the screw section for carrying out screwing wearing of the cap can also be formed in shaping of the body of a container, and coincidence, cheap-ization of a manufacturing cost can be promoted.

[0011] The description configuration of the opening instillation container by claim 4 of this invention has the depth of said crevice in the point constituted by the range which is 2-7mm. According to the above-mentioned description configuration, it is desirable that it is in the range of 5-7mm from a technical side, such as to obtain the yield and the stable inside plug function, although the deeper possible one of the depth of said crevice is desirable, but it is about 6mm most preferably. If this crevice depth becomes smaller than a suitable value, the problem that the liquid of that liquid reservoir jumps out through an inlet by the pressure produced when the point of that crevice, i.e., an inlet, is covered and it has a container by hand with the liquid with which the annular space in the container formed in the perimeter of a crevice (liquid reservoir) is covered with surface tension will arise. Moreover, if this crevice depth becomes larger than a suitable value, it will become easy to produce the defect that a crack goes into a crevice at the time of the process which forms this crevice. The optimum solution with which such opposite conditions are filled is 6mm. However, since it is few in the amount of a liquid reservoir and the depth of a crevice is not so required to be a drug solution with small surface tension, the depth of a crevice can also be designed shallowly.

[0012] the description configuration of the opening instillation container by claim 5 of this invention — the month by the side of the head of said crevice — a path is in the point constituted by the range which is 2-4mm. According to the above-mentioned description configuration, according to the acidity or alkalinity (surface tension, viscosity) of the liquid with which the body of a container is filled up, it adjusts within the limits of 4.0mm of $\phi 2.0 \text{ mm} - \phi$. the case where it is acidity or alkalinity with large surface tension in order to fixed-ize one drop measure (it adjusts to the object within the limits of the 25-50-micron liter per 1 in all drop measure) — said month — the case where a path is made small and surface tension is small acidity or alkalinity — said month — a path is enlarged.

[0013] The point which carries out the pressure welding of the needlelike die which forms shaping, the convex die which fabricates said crevice to the point of the body of a container with which the liquid is filled up into coincidence with the seal condition, and said inlet, and fabricates it from a container axis has the description configuration of the manufacture approach of the opening instillation container by claim 6 of this invention. According to the above-mentioned description configuration, the body of a container made from thermoplastics (body of a container of a bottle pack mold) with which the liquid is filled up into shaping and coincidence by blow molding, a vacuum forming, etc. with the seal condition is used. Although a head side forms in the point of this body of a container directly the inlet of the closed-end conic crevice which a bore becomes with size, and the minor diameter for controlling the amount of drops extruded from the body of a container at a preset value, therefore It can both take to press actuation of the body of a container by existence with a closed-end conic crevice and the inlet of a minor diameter as if there is little metal mold for manufacturing the body of a container as compared with the opening instillation container using the inside plug member which it injection molded and it ends, and dropping administration of the liquid of a constant rate can always be carried out certainly. And since the pressure welding of the needlelike die which forms the convex die which fabricates said crevice, and said inlet is only carried out from a container axis, it is also possible to form a closed-end conic crevice and the inlet of a minor diameter, transporting many bodies of a container. Therefore, since it is possible to process it into the point of the body of a container of a bottle pack mold, only forming the closed-end conic crevice for demonstrating an inside plug function and the inlet of a minor diameter, and transporting many bodies of a container moreover, the opening instillation container which can always carry out dropping administration of the liquid of a constant rate certainly can be advantageously manufactured in respect of a

manufacturing cost. Moreover, as claim 7 shows, the manufacture approach for the opening instillation container as a semifinished product with which the crevice by this invention mentioned above is formed is characterized by carrying out the pressure welding of the convex die which fabricates said crevice, and fabricating it from a container axis, to the point of the body of a container with which the liquid is filled up into shaping and coincidence with the seal condition, and has the above-mentioned operation effectiveness.

[0014] The point of heating the part fabricated with said convex die at least to the temperature which is not buckled with a heating means before shaping has the description configuration of the manufacture approach of the opening instillation container by claim 8 of this invention. It is ***** to aim at the improvement in the process tolerance of a crevice and the improvement of the yield which are formed in the point of said body of a container according to the above-mentioned description configuration.

[0015] The description configuration of the manufacture approach of the opening instillation container by claim 9 of this invention has said convex die and needlelike die in the point which fabricates a crevice and an inlet to the point of a container using the single die really formed. According to the above-mentioned description configuration, since a closed-end conic crevice and the inlet of a minor diameter can be formed with a single die, improvement in manufacture efficiency and simplification of a manufacturing facility can be attained.

[0016]

[Embodiment of the Invention] The [1st operation gestalt] Drawing 1 shows the opening instillation container of this invention mainly used for medical application, and consists of caps B screwed in male screw section 5a formed in the peripheral face of the screw cylinder part 5 of the body A of a container made from thermoplastics, and this body A of a container with the flexibility with which the drug solution of the specified quantity was filled up into blow molding or a vacuum forming, and coincidence free [attachment and detachment].

[0017] The pars basilaris ossis occipitalis 1 of the circle configuration to which said body A of a container curves inside, and the bell shape drum section 2 which stands in a row in the periphery of this, The neck 3 of the shape of a cylinder which follows shoulder part 2a of this drum section 2, and the step 4 in a circle which bulges in the method of the outside of the diameter direction from the upside location of this neck 3, While consisting of a screw cylinder part 5 equipped with male screw section 5a which follows a this upside, and a pouring-in cylinder part 6 equipped with pouring-in opening 6a which follows a this upside Tabular rib 3a which meets in the direction of container axis X is really formed in each of the part which are two circumferencial directions of said neck 3, and carries out phase opposite on both sides of the container axis X.

[0018] Inlet 6c of a controllable minor diameter is formed in the preset value at the pouring-in cylinder part 6 of said body A of a container in the amount of drops by which closed-end conic crevice 6b from which a bore serves as size becomes depressed, is formed, takes the pouring-in opening 6a side to the press actuation by the fingertip of said drum section 2 in the base of this crevice 6b, and it is extruded from the body A of a container.

[0019] the depth of said crevice 6b — the range of 2-7mm — desirable — the range of 5-7mm — while constituting in 6mm most preferably, the aperture (mouth path) of said pouring-in opening 6a is adjusted in the range of 4.0mm of $\phi 2.0$ mm- ϕ according to the acidity or alkalinity (surface tension, viscosity) of a drug solution. In order to fixed-ize one drop measure (it adjusts to the object within the limits of the 25-50-micron liter per 1 in all drop measure), when it is acidity or alkalinity with large surface tension, aperture of said pouring-in opening 6a is made small, and when surface tension is small acidity or alkalinity, aperture of said pouring-in opening 6a is enlarged.

[0020] Furthermore, said inlet 6c is formed using the needle of the path of the range of 0.8mm of $\phi 0.1$ mm- ϕ . Although the smaller one of the path of this needle is desirable and about $\phi 0.2$ mm is the most desirable, since it will become difficult technically if it is not much small, the needle of the range of 0.6mm of $\phi 0.4$ mm- ϕ is actually used for it.

[0021] When there are polyethylene, polyethylene polypropylene, polypropylene, polyethylene ethylene terephthalate, a polycarbonate, etc. and it screws in male screw section 5a of the body A of a container at said cap B as thermoplastics which is a component of said body A of a

container, the plug-like projection 8 which carries out [the projection] inner fitting to crevice 6b of this body A of a container, and is sealed is really formed.

[0022] Since it is common knowledge in the technical field concerned, the manufacture approach of the body A of a container before said crevice 6b and inlet 6c are formed is explained briefly. The main shaping metal mold 11 of the couple equipped with the 1st cavity 10 for fabricating the part of the range from the step 4 of said body A of a container in a circle to a pars basilaris ossis occipitalis 1 as shown in drawing 2 (b), Where aperture actuation is carried out, the subshaping metal mold 13 of the couple equipped with the 2nd cavity 12 for fabricating the screw cylinder part 5 and the pouring-in cylinder part 6 of the body A of a container From the extruder head 14 arranged in those upper parts, Bali Son 15 of the predetermined die length which is a hollow tube-like fritting heat-of-fusion plasticity ingredient long and slender is extruded along a perpendicular direction through between both the metal mold 11 and 13.

[0023] Next, as shown in drawing 2 (b), while carrying out closing actuation of said main shaping metal mold 11, it fabricates, expanding Bali Son 15 according to an entrainment operation or a vacuum operation of the compressed air along with shaping side 11a of the main shaping metal mold 11. As shown in drawing 2 (Ha), the liquid (drug solution) of the specified quantity is filled up with this condition from the drugs supply pipe 16. While carrying out closing actuation of said subshaping metal mold 13 as shown in drawing 2 (2) after this liquid restoration process is completed, it fabricates expanding Bali Son 15 according to an entrainment operation or a vacuum operation of the compressed air along with shaping side 13a of the subshaping metal mold 13, and shaping and the liquid with which coincidence was filled up are sealed (enclosure).

[0024] Next, the manufacture approach of the three-way-type type which forms closed-end conic crevice 6b and inlet 6c of a minor diameter in the pouring-in cylinder part 6 which is blow molding or a point of the body A of a container by which the vacuum forming was carried out is explained like ****, respectively. The metal convex die 20 which fabricates said closed-end conic crevice 6b by the manufacture approach of the 1st method shown in [manufacture approach of 1st method] drawing 3 (b) - (d), and the metal needlelike die 21 which forms said inlet 6c are used. Cone-like shaping projection 20B by which said convex die 20 fabricates closed-end conic crevice 6b to the point of anchoring shaft 20A, Shaping side 20C of the shape of a bowl which fabricates the peripheral face of the pouring-in cylinder part 6 of the body A of a container (the shape of a temple bell) is formed, and it is constituted, and said needlelike die 21 forms in the point of anchoring shaft 21A needlelike shaping projection 21B whose inlet 6c formation a minor diameter does, and is constituted.

[0025] And in the manufacture approach of this 1st method, as shown in drawing 3 (b), a part of pouring-in cylinder part 6 which is a point of the body A of a container is heated at a room temperature or 70 degrees C - 150 degrees C with the 1st heating means C, such as warm air or a halogen lamp, and a laser beam. Although whenever [stoving temperature] is based also on the construction material of the body A of a container, and a configuration, the temperature which the head of the body A of a container softens for a while is desirable. In the case where the thermoplastics of the body A of a container is a soft resin ingredient like polyethylene, since a point is buckled if it does not heat, it is necessary to heat the part fabricated with said convex die 20 at least to the temperature which is not buckled with the 1st heating means C before shaping. However, in the case of the resin ingredient and the configuration where a buckling can be borne (i.e., when it can be equal to press from [of the convex die 20] container axis X), it can fabricate also at a room temperature.

[0026] Next, as shown in drawing 3 (b), before a part of pouring-in cylinder part 6 of the body A of a container heated with the 1st heating means C gets cold, said convex die 20 is pressed from container axis X, and the pouring-in opening 6a side fabricates closed-end conic crevice 6b which a bore becomes with size to the pouring-in cylinder part 6 of the body A of a container. At this time, the weld flash at the time of the blow molding which projects in the peripheral face of the pouring-in cylinder part 6 of the body A of a container is removable with bowl-like shaping side 20C of said convex die 20.

[0027] Said convex die 20 very thing is doubled with the configuration and thickness of the pouring-in cylinder part 6 of the body A of a container fabricated, and carries out temperature

control in 150 degrees C from a room temperature. In consideration of cooling solidification at the head of the pouring-in cylinder part 6, the lowest possible temperature is desirable as whenever [stoving temperature]. It enables it to exchange this convex die 20 simply according to the acidity or alkalinity of the liquid with which it fills up.

[0028] Next, as shown in drawing 3 (Ha) and (d), inlet 6c of a controllable minor diameter is formed in a preset value for the amount of drops which presses the needlelike die 21 from container axis X, takes to the press actuation by the fingertip of a drum section 2 to the base mid gear of crevice 6b formed in the pouring-in cylinder part 6 of said body A of a container, and is extruded from the body A of a container. In the formation process of inlet 6c by needlelike projection 21B of this needlelike die 21, the approach of working needlelike projection 21B with a room temperature, and the method of working, after heating needlelike projection 21B are proposed. the configuration of inlet 6c which forms the approach which should be adopted, and the configuration of crevice 6b — it is chosen, corresponding [being carried out and] to conditions, such as a configuration of others of a container, and construction material, a manufacturing cost. As whenever [stoving temperature / in the case of requiring heating], the temperature of the needlelike die 21 to which the resin of container construction material fuses needlelike projection 21B at least, and the range of 130 degrees C - 180 degrees C are suitable. [0029] The 2nd heating means D, such as high-frequency induction heating, a halogen lamp, and warm air, perform heating of the needlelike die 21, and anchoring shaft 21A which is the root of the needlelike die 21 is constituted so that it may cool with the cooling means E, such as a water jacket and the compressed air. And when said needlelike die 21 is cooled by even predetermined temperature, this needlelike die 21 is sampled along the direction of container axis X from the pouring-in cylinder part 6 of the body A of a container fabricated by the predetermined configuration.

[0030] Said needlelike die 21 may perform plating or Teflon (trademark) coating, and surface treatment of special plating to a front face in order to improve the detachability of resin, and a mold-release characteristic. As for this surface treatment, what does not exfoliate simply [can bear an elevated temperature and] is desirable.

[0031] By the manufacture approach of the 2nd method shown in [manufacture approach of 2nd method] drawing 4 (b) - (d), the metal convex die 20 which fabricates said closed-end conic crevice 6b, and the metal needlelike die 21 which forms said inlet 6c are used like the 1st method. Said convex die 20 forms in the point of anchoring shaft 20A only cone-like shaping projection 20B which fabricates closed-end conic crevice 6b, and is constituted. Moreover, said needlelike die 21 Needlelike shaping projection 21B which forms inlet 6c of a minor diameter in the point of anchoring shaft 21A, Shaping side 21C of the shape of a bowl which fabricates the peripheral face of the pouring-in cylinder part 6 of the body A of a container (the shape of a temple bell) is formed, it is constituted, and root partial 21b of said needlelike shaping projection 21B is further formed in the cone configuration in alignment with crevice 6b formed in said cone-like shaping projection 20B.

[0032] Although it constituted from the 1st method so that the weld flash at the time of the blow molding which projects in the peripheral face of the pouring-in cylinder part 6 of the body A of a container at the time of shaping by the convex die 20 might be removed as shown in drawing 3 (b) It constitutes from this 2nd method so that the weld flash at the time of the blow molding which projects in the peripheral face of the pouring-in cylinder part 6 of the body A of a container at the time of shaping by the needlelike die 21 may be removed, as shown in drawing 4 (Ha), and the other configuration is the same as that of the 1st method.

[0033] The metal single die 22 with which the convex die which fabricates said closed-end conic crevice 6b by the manufacture approach of the 3rd method shown in [manufacture approach of 3rd method] drawing 5 (b) - (d), and the needlelike die which forms said inlet 6c are really formed is used. While this single die 22 forms cone-like shaping projection 22B which fabricates closed-end conic crevice 6b to the point of anchoring shaft 22A, and shaping side 22D of the shape of a bowl which fabricates the peripheral face of the pouring-in cylinder part 6 of the body A of a container (the shape of a temple bell) Needlelike shaping projection 22C which forms inlet 6c of a minor diameter at the head of said cone-like shaping projection 22B is really formed by

concentric voice, and it is constituted.

[0034] By the manufacture approach of this 3rd method, as shown in the drawing 5 (**) and (**), the head side of the pouring-in cylinder part 6 of the body A of a container is not heated, but after getting cold even in a room temperature, needlelike shaping projection 22C which forms inlet 6c of a minor diameter is pierced to this side which forms crevice 6b to the head of the pouring-in cylinder part 6 of the body A of a container also with the fabricated temperature (70 degrees C - 80 degrees C).

[0035] Needlelike shaping projection 22C which was able to be pierced at the head of the pouring-in cylinder part 6 of the body A of a container is heated by the high-frequency-induction-heating means which is an example of the 2nd heating means D, as shown in drawing 5 (Ha). the range which near the temperature which a container ingredient fuses is desirable as for whenever [stoving temperature], and is usually 120 degrees C - 200 degrees C -- it is preferably controlled near 160 degree C. The single die 22 equipped with needlelike shaping projection 22C and cone-like shaping projection 22B is pushed in 8mm from 2mm, being heated as shown in drawing 5 (d), and it fabricates closed-end conic crevice 6b, pressurizing so that the head side of the pouring-in cylinder part 6 of the body A of a container may be compressed from container axis X.

[0036] Although the deeper one of pushing of cone-like shaping projection 22B of this single die 22 is desirable, it considers as the range of 5-7mm from a technical issue. At this time, a vent hole may be established in the single die 22 so that air bubbles may not go into the point of the pouring-in cylinder part 6 of the fused body A of a container (since the resin of a point is fused thoroughly, deflation is the need).

[0037] As shown in drawing 11 (b), anchoring shaft 22A which is the root of the single die 22 is constituted so that it may cool with the cooling means E, such as a water jacket and the compressed air. And when said single die 22 is cooled by even predetermined temperature, this single die 22 is sampled along the direction of container axis X from the pouring-in cylinder part 6 of the body A of a container fabricated by the predetermined configuration.

[0038] Said single die 22 may perform plating or Teflon coating, and surface treatment of special plating to a front face in order to improve the detachability of resin, and a mold-release characteristic. As for this surface treatment, what does not exfoliate simply [can bear 280 degrees C or more, and] is desirable. And closed-end conic crevice 6b by the side of the point of the body A of a container fabricated by which manufacture approach of the 1st method to the 3rd method and inlet 6c of a minor diameter have a function as an inside plug. Improving prevention of air bubbles biting and the piece of air bubbles is mentioned in one stable drop measure and one drop of drop. Moreover, also in the 2nd method and the 3rd method which were mentioned above, in the formation process of needlelike projection 21B or inlet 6c to 22C Depend, as mentioned above, it is also possible [after heating needlelike projection 21B or 22C with the 2nd heating means D, it was working, but] not to perform such heating depending on the case, but for inlet 6c to form using needlelike projection 21B of a room temperature condition or 22C.

[0039] Next, the manufacture machine used for the manufacture approach of said 1st method to the 3rd method is explained. The conveyance supply means F which carries out installation conveyance of blow molding or many bodies A of a container by which the vacuum forming was carried out in accordance with a straight line-like supply path as shown in drawing 6 - drawing 11 A container feed means G to convey the body A of a container by which installation conveyance has been carried out in accordance with a radii-like feed path from a top thing with this conveyance supply means F It pinches near [which has been fed from this container feed means G] the body A of a container a shoulder or near it. A pinching migration means H to transport in accordance with a radii-like pinching migration path in the horizontal direction and the condition of having prevented migration in a lower part at least of this body A of a container A container delivery means J to receive the body A of a container after processing transported in accordance with the circular pinching migration path of this pinching migration means H, and to transport in accordance with a radii-like delivery path is established.

[0040] While a 1st heating means C to heat a part of pouring-in cylinder part 6 which is a point

of the body A of a container is arranged by said container feed means G, moreover, for said pinching migration means H A change means K to change the convex die 20, the needlelike die 21, or the single die 22 with which it is selectively equipped free [*****] to the point of the body A of a container by which pinching migration is carried out with this pinching migration means H to a position in readiness and a fabricating-operation location, and to operate it The inside of the body A of a container by which pinching migration is carried out by the pinching pawl of the couple of said pinching migration means H, The alignment means L changed to the condition of being attached outside from container axis X to the part by the side of the head which projects from the pinching pawl of a couple, and the standby condition from which it was made to secede is arranged. Furthermore, the high-frequency-induction-heating means D which is an example of the 2nd heating means which heats the needlelike die 21 or the single die 22 which is a die in the middle of is established. [the circular pinching migration path of said pinching migration means H]

[0041] actuation sprocket which can be freely rotated to a machine frame 24 by the circumference of the axis-of-abscissa heart interlocked with the electric motor 26 to the longitudinal direction both ends of the mounting ***** conveyance frame 25 as said conveyance supply means F is shown in drawing 6 (not shown) While winding the endless conveyance object 29 which prepares the driven sprocket wheel (not shown) which can rotate freely by the circumference of the axis-of-abscissa heart, covers said both sprockets, and carries out installation conveyance of many bodies A of a container The conveyance guide plate 30 of a left Uichi pair which carries out conveyance advice of the body A of a container on the endless conveyance object 29 is formed, and it is constituted.

[0042] As said container feed means G is shown in drawing 6 and drawing 7 , at the periphery edge of the actuation rotor plate 34 by which is interlocked with an electric motor 33 and an actuation revolution is carried out by the circumference of the axis-of-ordinate heart While the top body A of a container sent out from said conveyance supply means F forms two or more concave attaching parts 35 entered and held at constant pitch along with a circumferential direction The installation guide plate 36 which catches the pars basilaris ossis occipitalis of the body A of a container held in said each attaching part 35, and carries out migration advice, and the migration guide 37 which prevents the ejection migration to the method of the outside of the radius-of-gyration direction of the body A of a container held in said each attaching part 35 are formed, and it is constituted.

[0043] Said 1st heating means C is used only at the time of manufacture of the 1st method and the second method which were mentioned above, and is constituted as follows. As shown in drawing 6 and drawing 7 , namely, the inside of the actuation rotor plate 34 of said container feed means G, To each of the part (with the drawing concerned, it simplifies and only one place is indicated) corresponding to each attaching part 35 Where migration energization is carried out, while forming the rise-and-fall frame 40 which equipped this actuation rotor plate 34 with the rise-and-fall guide shafts 40a and 40b of the couple which slides in the vertical direction along with breakthrough 34a of the couple by which penetration formation was carried out in a descent side by the compression coil spring 41 The thermal insulation plate 42 which can be attached outside free [desorption] is attached in the upper part of each of said rise-and-fall frame 40 from container axis X to a part for the bottom flank of the pouring-in cylinder part 6 of the body A of a container held at the attaching part 35.

[0044] moreover, at the supporter material 44 by the side of the machine frame 24 which carries out a response location on the rotation migration locus of the roller 43 formed in the lower part of each of said rise-and-fall frame 40 When it feeds into the container delivery location to the pinching migration means H and is conveyed from the container supply location of the conveyance supply means F, When it is made to descend to the thermal insulation operation position in which outer fitting of said thermal insulation plate 42 was carried out to a part for the bottom flank of the pouring-in cylinder part 6 of the body A of a container, and returns to a container supply location and is conveyed from a container delivery location, The cam member 45 which raises the standby position which resisted the elastic stability of said compression coil spring 41, and estranged the thermal insulation plate 42 up is attached free [height control].

[0045] Furthermore, the hot blast supply pipe 46 which supplies 200 degrees C – 500 degrees C hot blast is formed in each of the part corresponding to each attaching part 35 among the actuation rotor plates 34 of said container feed means G to the crowning of the pouring-in cylinder part 6 which is a point of the body A of a container held at each attaching part 35.

[0046] Said pinching migration means H is the periphery edge of the actuation rotor plate 51 by which is interlocked with an electric motor 50 and an actuation revolution is carried out by the circumference of the axis-of-ordinate heart, as shown in drawing 6 , drawing 8 , and drawing 10 . To and two or more each (with the drawing concerned, it simplifies and only one place is indicated) which separated predetermined spacing to the hand of cut The actuation shaft 42 of a couple which can rotate freely by the circumference of the axis-of-ordinate heart parallel to the revolving-shaft heart of the actuation rotor plate 51 is supported. In the upper bed section of both the actuation shaft 42 While attaching the pinching pawl 43 of the couple equipped with pinching side 53a of a semicircle arc for pinching in the state of fitting horizontally to the neck 3 used as the circular-sulcus section of the body A of a container Outer fitting immobilization of the gear 54 which carries out engagement linkage mutually is carried out, and the fluid cylinder 56 which carries out closing motion actuation of the pinching pawl 43 of said couple between the operating arm 55 which fixed in the soffit section of one actuation shaft 42, and the actuation rotor plate 51 side is further constructed over said both actuation shaft 42.

[0047] Moreover, the installation sliding guide plate 57 which carries out sliding advice of the pars basilaris ossis occipitalis 1 of the body A of a container by which pinching migration is carried out at said both pinching pawl 43 in the state of installation, and the migration guide member 58 which prevents the ejection migration to the method of the outside of the radius-of-gyration direction of the body A of a container by which pinching migration is carried out at said both pinching pawl 43 are prepared.

[0048] and where the neck 3 of the body A of a container is pinched by the pinching pawl 43 of said couple Since it is in the horizontal direction and the condition of having prevented migration in a lower part at least of this body A of a container While alignment precision with the convex die 20, the needlelike die 21, or the single die 22 with which the body A of a container and said change means K are equipped free [*****] becomes high Lowering of the process tolerance of closed-end conic crevice 6b resulting from the elastic deformation in the direction of container axis X of the body A of a container accompanying press of a die and inlet 6c of a minor diameter can be controlled.

[0049] As said change means K is shown in drawing 8 and drawing 9 , the inside of the actuation rotor plate 51, To two or more each (with the drawing concerned, it simplifies and only one place is indicated) corresponding to each ***** 43 The movable frame 60 by which both-way migration is carried out is arranged in the radius-of-gyration direction and the vertical direction. To two places of the radius-of-gyration direction of head side anchoring section 60A of this movable frame 60 While attaching two holder cylinder axes 62 which went caudad and were equipped with shafting arrival opening which carries out opening free [desorption] through a nut 63, to shafting arrival opening of each of said holder cylinder axis 62 Screwing wearing of the nut 61 which holds selectively anchoring shaft 20A of the convex die 20, anchoring shaft 21A of the needlelike die 21, or anchoring shaft 22A of the single die 22 free [a replacement] has been carried out. moreover, for the rise-and-fall block 64 held free [sliding], two level slide shafts 60B of said good repere mobile 60 The vertical slide shafts 65 and 66 with which two die length which slides free [rise and fall] to the actuation rotor plate 51 differs are extended caudad. Among those, while connecting the soffit section of the long vertical slide shaft 65 with the rise-and-fall connection object 67 which can slide freely in accordance with the rise-and-fall guide shaft 68 of the couple in which it was prepared by the machine frame 24 The screw shaft 70 screwed in the crosswise mid gear of said rise-and-fall connection object 67 from the upper and lower sides The electric motor 69 fixed to the machine frame 24 is interlocked with, and the hydrostatic pressure cylinder 71 which makes the slide migration of the movable frame 60 carry out in the radius-of-gyration direction to said rise-and-fall block 64 is further attached in said actuation rotor plate 51.

[0050] The axis of the 1st holder cylinder axis 62 by the side of the short length located in the

method of the inside of the radius-of-gyration direction among said both holder cylinder axes 62. It is constituted so that it may agree with the axis X of the body A of a container pinched by the pinching pawl 43 of a couple. In carrying out shaping actuation of the convex die 20, the needlelike die 21, or the single die 22 with which the 2nd holder cylinder axis 62 by the side of the long picture located in the method of the inside of the radius-of-gyration direction was equipped selectively. You carry out actuation control of said hydrostatic pressure cylinder 71, and the axis of the 2nd holder cylinder axis 62 makes it slide to the location which agrees with the axis X of the body A of a container pinched by the pinching pawl 43 of a couple.

[0051] Moreover, in carrying out shaping actuation of the convex die 20, the needlelike die 21, or the single die 22 with which said both holder cylinder axis 62 was equipped selectively, actuation control of said electric motor 69 is carried out, and only the specified quantity drops the movable frame 60, and from a position in readiness, a die is changed to a fabricating-operation location and it operates it.

[0052] As said alignment means L is shown in drawing 8 and drawing 11, in the upper part of the movable tube-like object 75 sheathing of the slide migration of was made free in accordance with said vertical slide shafts 65 and 66. While attaching the **** annular solid 76 which has formed fitting hole 76a attached outside from container axis X to the screw cylinder part 5 of the body A of a container pinched by the pinching pawl 43 of a couple. Between said movable tube-like object 75 and machine frame 24 sides, the hydrostatic pressure cylinder 77 which said **** annular solid 76 is changed [cylinder] to the alignment location which fits into the screw cylinder part 5 of the body A of a container, and the position in readiness which the upper part was made to estrange, and operates it is attached.

[0053] As shown in drawing 11 (b), while the water jacket 80 which constitutes the cooling means E is formed, the feed water communication trunk 81 which supplies cooling water to said water jacket 80, and the wastewater communication trunk 82 which discharges the cooling water in a water jacket 80 are formed in each of said both holder cylinder axis 62.

[0054] And it pinches near [where the liquid is filled up into shaping and coincidence with the seal condition like the above-mentioned] the body A of a container a shoulder or near it. A pinching migration means H to transport in accordance with a path in the horizontal direction and the condition of having prevented migration in a lower part at least of this body A of a container. When a change means K to change the needlelike die 21 which forms the convex die 20 which fabricates said crevice 6b with this pinching migration means H to the point of the body A of a container by which pinching migration is carried out, and said inlet 6c to a position in readiness and a fabricating-operation location, and to operate it is established, the following operation and effectiveness are done so.

[0055] Namely, the body A of a container made from thermoplastics (body of a container of a bottle pack mold) with which the liquid is filled up into shaping and coincidence by blow molding, a vacuum forming, etc. with the seal condition is used. Although a head side forms in the point of this body A of a container directly closed-end conic crevice 6b which a bore becomes with size, and inlet 6c of the minor diameter for controlling the amount of drops extruded from the body A of a container at a preset value, therefore It can both take to press actuation of the body A of a container by existence with closed-end conic crevice 6b and inlet 6c of a minor diameter as if there is little metal mold for manufacturing the body of a container as compared with the opening instillation container using the inside plug member which it injection molded and it ends, and dropping administration of the liquid of a constant rate can always be carried out certainly.

[0056] And the point of the body A of a container by which pinching migration is carried out with said pinching migration means H is received. In case the convex die 20 and the needlelike die 21 are changed to a fabricating-operation location, are operated from a position in readiness and closed-end conic crevice 6b and inlet 6c of a minor diameter are formed, it pinches near the body A of a container a shoulder or near it with the pinching migration means H. the horizontal direction of this body A of a container — and, while alignment precision with the body A of a container, the convex die 20, and the needlelike die 21 becomes high, since migration in a lower part is prevented at least. Lowering of the process tolerance of closed-end conic crevice 6b resulting from the elastic deformation in the direction of container axis X of the body A of a

container and inlet 6c of a minor diameter can be controlled.

[0057] Therefore, cheap-ization of the manufacturing cost which is the advantage which the body A of a container of a bottle pack mold has can be promoted more, aiming at improvement in the process tolerance of closed-end conic crevice 6b for taking to press actuation of the body A of a container, and always carrying out dropping administration of the liquid of a constant rate certainly, and inlet 6c.

[0058] Moreover, when the alignment means L changed to the condition of being attached outside from container axis X like the above-mentioned to the part by the side of the head which projects from the pinching pawl 53 among the bodies A of a container by which pinching migration is carried out by the pinching pawl 53 of said pinching migration means H, and the standby condition from which it was made to secede is established, the following operation and effectiveness are done so.

[0059] To the part by the side of the head of the body A of a container pinched by the pinching pawl 53 of said pinching migration means H namely, by carrying out outer fitting of the alignment means L from container axis X Alignment precision with the body A of a container, the convex die 20, and the needlelike die 21 becomes still higher, and improvement in the process tolerance of closed-end conic crevice 6b for taking to press actuation of the body A of a container, and always carrying out dropping administration of the liquid of a constant rate certainly and inlet 6c can be promoted.

[0060] furthermore, when a high-frequency-induction-heating means D to heat a die in the middle of the pinching migration path of said pinching migration means H is established like the above-mentioned With the high-frequency-induction-heating means D established in the middle of the migration path, carrying out pinching migration of the body A of a container continuously with said pinching migration means H Since a die can be quickly overheated even to even whenever [setting-out stoving temperature], the improvement of the yield can be aimed at further, promoting improvement in manufacture efficiency and process tolerance.

[Translation done.]

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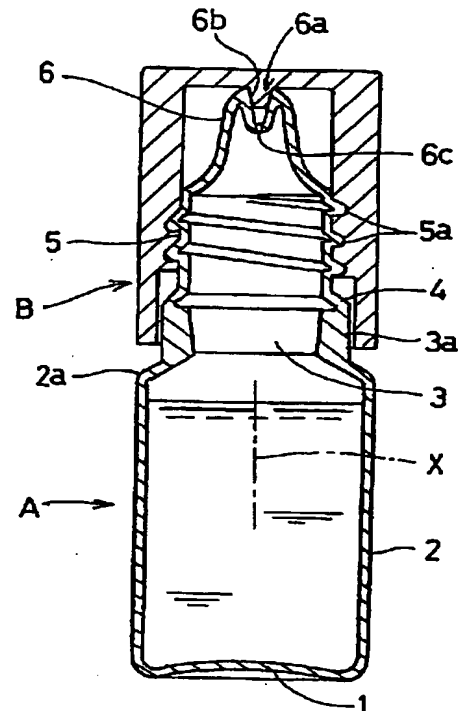
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(54) 【発明の名称】 開口点眼容器及びその製造方法

(57) 【要約】

【課題】 ボトルパック型の容器本体の持つ利点である製造コスト面での優位性を損なうことなく、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる開口点眼容器を提供する。

【解決手段】 成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体Aの先端部に、先端側ほど内径が大となる有底円錐状の凹部6bを窪み形成し、この凹部6bの底面に、容器本体Aから押出される液滴量を設定量に制御するための小径の注液孔6cを貫通形成してある。



【特許請求の範囲】

【請求項 1】 成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部を窪み形成し、この凹部の底面に、容器本体から押出される液滴量を設定量に制御するための小径の注液孔を貫通形成してある開口点眼容器。

【請求項 2】 成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部を窪み形成し、その際この窪みは、この凹部の底面に容器本体から押出される液滴量を設定量に制御するための小径の注液孔を前記凹部の底面に貫通形成可能となる形状を備えている開口点眼容器。

【請求項 3】 前記容器本体には、該容器本体の凹部を密封する状態でキャップを脱着自在に螺合装着するためのネジ部が一体形成されている請求項 1 又は 2 記載の開口点眼容器。

【請求項 4】 前記凹部の深さが 2 ～ 7 mm の範囲に構成されている請求項 1、2 又は 3 記載の開口点眼容器。

【請求項 5】 前記凹部の先端側の口元径が 2 ～ 4 mm の範囲に構成されている請求項 1、2、3 又は 4 記載の開口点眼容器。

【請求項 6】 請求項 1、3、4 又は 5 記載の開口点眼容器の製造方法であって、成形と同時に液体が密封状態で充填されている容器本体の先端部に、前記凹部を成形する凸状成型型及び前記注液孔を形成する針状成型型を容器軸線方向から圧接して成形する開口点眼容器の製造方法。

【請求項 7】 請求項 2 記載の開口点眼容器の製造方法であって、成形と同時に液体が密封状態で充填されている容器本体の先端部に、前記凹部を成形する凸状成型型を容器軸線方向から圧接して成形する開口点眼容器の製造方法。

【請求項 8】 少なくとも前記凸状成型型で成形される部位を、成形前に加熱手段で座屈しない温度に加熱する請求項 6 又は 7 記載の開口点眼容器の製造方法。

【請求項 9】 前記凸状成型型と針状成型型とが一体形成されている単一の成型型を用いて、容器の先端部に凹部と注液孔とを成形する請求項 6 記載の開口点眼容器の製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、医療用点眼液に用いる開口点眼容器及びその製造方法の改良に関する。

【0002】

【従来の技術】医療用点眼液においては点眼量を一定量に制御する必要がある。この点眼量を制御できる一般的な開口点眼容器としては、成形された容器本体の筒状口部に、射出成形品の中栓部材を内嵌固定し、この中栓部

材には、先端側ほど内径が大となる有底円錐状の凹部と、該凹部の底面中心位置で内外に貫通して、容器本体から押出される液滴量を制御する小径の注液孔とを形成するとともに、前記容器本体の筒状口部の外周面に形成された雄ネジ部に、中栓部材の有底円錐状凹部を嵌合状態で密封するための栓状突起を備えた射出成形品のキャップを螺合装着したものが汎用されている。

【0003】この開口点眼容器による場合は、中栓部材に形成された有底円錐状の凹部及び該凹部の底面中心位置に貫通形成された小径の注液孔との存在により、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができるものの、3つの部材をそれぞれ各別に射出成形するための金型が必要で、また各部材の洗浄・滅菌作業が必要となり、製造コストが高くなる。

【0004】一方、製造コストを下げ、且つ、開口点眼容器としての機能を保持させ得る容器として一体成形容器が使用されている。この容器においては、ブロー成形又は真空成形と同時に液体が充填・封入されている熱可塑性材料製の容器本体（通称、ボトルパック型の容器本体）のうち、先端部側の外周面に形成した雄ネジ部に、容器本体の先端部に注液孔を貫通形成するための針状突起を一体形成してあるキャップを脱着自在に螺合して、該キャップの通常の閉止位置よりも一段深い締込み側への螺合操作により、キャップの針状突起で容器本体の先端部に注液孔を貫通形成するように構成していた。

【0005】

【発明が解決しようとする課題】上述のボトルパック型の開口点眼容器では、射出成形された中栓部材を用いる開口点眼容器に比して製造コストの低廉化を図ることができる利点を有するものの、容器本体の先端部をキャップの針状突起で突き破りながら注液孔を形成するため、キャップの通常閉止位置からの締込み側への螺合操作量が適切に行われないと、注液孔の形状や大きさが不均一となり、容器本体から押出される液滴量の変動を招来する可能性がある。

【0006】また、容器本体の先端部に注液孔が貫通形成された後において、キャップを通常閉止位置よりも締込み側に過剰操作すると、その過剰な締込み操作の度に、キャップの針状突起で注液孔を拡張することになり、容器本体から押出される液滴量が次第に増大する可能性がある。

【0007】そのため、開口点眼容器の使用方法についての十分な説明が必要となるが、例え、十分な説明を施しても、キャップを締込み側へ適当に螺合操作して穿孔したり、或いは、キャップを過剰に締込み操作することがあるため、前述のような誤った使用を確実に回避することは困難であった。

【0008】本発明は、上述の実状に鑑みて為されたものであって、その第 1 の主たる課題は、ボトルパック型の容器本体の持つ利点である製造コスト面での優位性を

損なうことなく、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる開口点眼容器を提供する点にあり、第2の主たる課題は、製造コストの低廉化を促進することのできる製造方法を提供する点にある。

【0009】

【課題を解決するための手段】本発明の請求項1による開口点眼容器の特徴構成は、成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部を窪み形成し、この凹部の底面に、容器本体から押出される液滴量を設定量に制御するための小径の注液孔を貫通形成した点にある。上記特徴構成によれば、ブロー成形や真空成形等による成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体（ボトルパック型の容器本体）を利用して、この容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部と、容器本体から押出される液滴量を設定量に制御するための小径の注液孔とを直接形成するが故に、射出成形された中栓部材を用いる開口点眼容器に比して容器本体を製造するための金型が少なく済むとともに、有底円錐状の凹部と小径の注液孔との存在により、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる。従って、ボトルパック型の容器本体の先端部に中栓機能を発揮させるための有底円錐状の凹部と小径の注液孔とを形成するだけであるから、ボトルパック型の容器本体の持つ利点である製造コスト面での優位性を損なうことなく、常に一定量の液体を確実に滴下投与することができる。本発明による開口点眼容器で特に重要な点は、液滴量を設定量に制御するための小径の注液孔を貫通形成することができる形状をもった凹部を、成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に形成することである。このことから、本発明の枠内には、そのような凹部が形成された半完成品としての開口点眼容器もはいるものであり、そのような開口点眼容器の構成は、請求項2に記載するように、成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部を窪み形成し、その際この窪みは、この凹部の底面に容器本体から押出される液滴量を設定量に制御するための小径の注液孔を前記凹部の底面に貫通形成可能となる形状を備えているという特徴を備えている。

【0010】本発明の請求項3による開口点眼容器の特徴構成は、前記容器本体に、該容器本体の凹部を密封するキャップを脱着自在に螺合装着するためのネジ部が一体形成されている点にある。上記特徴構成によれば、容器本体の成形と同時に、キャップを螺合装着するためのネジ部も形成することができるから、製造コストの低廉化を促進することができる。

【0011】本発明の請求項4による開口点眼容器の特徴構成は、前記凹部の深さが2～7mmの範囲に構成されている点にある。上記特徴構成によれば、前記凹部の深さはできるだけ深い方が望ましいが、歩留まりや安定した中栓機能を得る等の技術面から、5～7mmの範囲にあることが望ましいが、最も好ましくは6mm程度である。この凹部深さが適切な値より小さくなると、凹部の周囲に形成される容器内の環状の空間（液溜まり）に表面張力によって溜まる液によってその凹部の先端部、つまり注液孔が覆われ、容器を手で持った際に生じる圧力でその液溜まりの液が注液孔を通じて飛び出すといった問題が生じる。また、この凹部深さが適切な値より大きくなると、この凹部を形成する工程時に、凹部に亀裂がはいるといった不良が生じやすくなる。このような相反する条件を満たす最適解が6mmである。しかし、表面張力が小さい薬液の場合には液溜まりの量を少なく、凹部の深さはそれほど必要ではないので、凹部の深さを浅く設計することもできる。

【0012】本発明の請求項5による開口点眼容器の特徴構成は、前記凹部の先端側の口元径が2～4mmの範囲に構成されている点にある。上記特徴構成によれば、容器本体に充填される液体の液性（表面張力、粘度）に合わせてφ2.0mm～φ4.0mmの範囲内で調整する。1滴量を一定化（目的に合わせて1滴量当たり25～50ミクロンリットルの範囲内に調整）するため、表面張力が大きい液性の場合には、前記口元径を小さくし、表面張力が小さい液性の場合には、前記口元径を大きくする。

【0013】本発明の請求項6による開口点眼容器の製造方法の特徴構成は、成形と同時に液体が密封状態で充填されている容器本体の先端部に、前記凹部を成形する凸状成型型及び前記注液孔を形成する針状成型型を容器軸線方向から圧接して成形する点にある。上記特徴構成によれば、ブロー成形や真空成形等による成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体（ボトルパック型の容器本体）を利用して、この容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部と、容器本体から押出される液滴量を設定量に制御するための小径の注液孔とを直接形成するが故に、射出成形された中栓部材を用いる開口点眼容器に比して容器本体を製造するための金型が少なく済むとともに、有底円錐状の凹部と小径の注液孔との存在により、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる。しかも、前記凹部を成形する凸状成型型及び前記注液孔を形成する針状成型型を容器軸線方向から圧接するだけであるから、多数の容器本体を移送しながら有底円錐状の凹部と小径の注液孔とを形成することも可能である。従って、ボトルパック型の容器本体の先端部に、中栓機能を発揮させるための有底円錐状の凹部と小径の注液孔とを形成するだけであり、

しかも、多数の容器本体を移送しながら加工することが可能であるから、常に一定量の液体を確実に滴下投与することのできる開口点眼容器を製造コスト面で有利に製造することができる。また、上述した、本発明による凹部が形成されている半完成品としての開口点眼容器のための製造方法は、請求項7で示すように、成形と同時に液体が密封状態で充填されている容器本体の先端部に、前記凹部を成形する凸状成型型を容器軸線方向から圧接して成形することで特徴付けられ、前述の作用効果を有する。

【0014】本発明の請求項8による開口点眼容器の製造方法の特徴構成は、少なくとも前記凸状成型型で成形される部位を、成形前に加熱手段で座屈しない温度に加熱する点にある。上記特徴構成によれば、前記容器本体の先端部に形成される凹部の加工精度の向上と歩留まりの改善とを図ることができる。

【0015】本発明の請求項9による開口点眼容器の製造方法の特徴構成は、前記凸状成型型と針状成型型とが一体形成されている単一の成型型を用いて、容器の先端部に凹部と注液孔とを成形する点にある。上記特徴構成によれば、単一の成型型で有底円錐状の凹部と小径の注液孔とを形成することができるから、製造能率の向上と製造設備の簡素化を図ることができる。

【0016】

【発明の実施の形態】〔第1実施形態〕図1は、主として医療用に用いられる本発明の開口点眼容器を示し、ブロー成形又は真空成形と同時に所定量の薬液が充填された可撓性のある熱可塑性材料製の容器本体Aと、該容器本体Aのネジ筒部5の外周面に形成された雄ネジ部5aに着脱自在に螺合されるキャップBとから構成されている。

【0017】前記容器本体Aは、内側に彎曲する円形状の底部1と、これの周縁に連なる中空円筒状の胴部2と、該胴部2の肩部分2aに連続する円筒状の首部3と、該首部3の上側位置から直径方向外方に膨出する円環状段部4と、これの上側に連続する雄ネジ部5aを備えたネジ筒部5と、これの上側に連続する注液口6aを備えた注液筒部6とから構成されるとともに、前記首部3の円周方向二個所で、かつ、容器軸線Xを挟んで相対向する部位の各々には、容器軸線X方向に沿う板状のリップ3aが一体形成されている。

【0018】前記容器本体Aの注液筒部6には、注液口6a側ほど内径が大となる有底円錐状の凹部6bが窪み形成され、この凹部6bの底面には、前記胴部2の指先による押圧操作に連れて容器本体Aから押出される液滴量を設定量に制御可能な小径の注液孔6cが形成されている。

【0019】前記凹部6bの深さは2～7mmの範囲、好ましくは、5～7mmの範囲、最も好ましくは6mmに構成するとともに、前記注液口6aの口径（口元径）

は、薬液の液性（表面張力、粘度）に合わせて $\phi 2.0\text{ mm} \sim \phi 4.0\text{ mm}$ の範囲で調整する。1滴量を一定化（目的に合わせて1滴量当たり25～50ミクロンリットルの範囲内に調整）するため、表面張力が大きい液性の場合には、前記注液口6aの口径を小さくし、表面張力が小さい液性の場合には、前記注液口6aの口径を大きくする。

【0020】更に、前記注液孔6cは、 $\phi 0.1\text{ mm} \sim \phi 0.8\text{ mm}$ の範囲の径の針を用いて形成する。この針の径は、小さい方が好ましく、 $\phi 0.2\text{ mm}$ 程度が最も好ましいが、あまり小さいと技術的に困難となるので、実際には、 $\phi 0.4\text{ mm} \sim \phi 0.6\text{ mm}$ の範囲の針を用いる。

【0021】前記容器本体Aの構成材料である熱可塑性材料としては、ポリエチレン、ポリエチレンーポリプロピレン、ポリプロピレン、ポリエチエチレンテレフタレート、ポリカーボネート等があり、また、前記キャップBには、容器本体Aの雄ネジ部5aに螺合したとき、該容器本体Aの凹部6bに内嵌して密封する栓状突起8が一体形成されている。

【0022】前記凹部6b及び注液孔6cが形成される前の容器本体Aの製造方法については、当該技術分野において周知であるので、簡単に説明する。図2（イ）に示すように、前記容器本体Aの円環状段部4から底部1までの範囲の部分成形するための第1キャビティ10を備えた一对の主成型金型11と、容器本体Aのネジ筒部5及び注液筒部6を成形するための第2キャビティ12を備えた一对の副成型金型13とを開き作動させた状態で、それらの上部に配置した押し機ヘッド14から、両金型11、13間を通して垂直方向に沿って細長く中空チューブ状の半溶融熱可塑性材料である所定長さのバリソン15を押出す。

【0023】次に、図2（ロ）に示すように、前記主成型金型11を閉じ作動させるとともに、圧縮空気の吹き込み作用又は真空作用によって、主成型金型11の成形面11aに沿ってバリソン15を膨張させながら成形する。この状態で、図2（ハ）に示すように、薬剤供給管16から所定量の液体（薬液）を充填する。この液体充填工程が終了すると、図2（ニ）に示すように、前記副成型金型13を閉じ作動させるとともに、圧縮空気の吹き込み作用又は真空作用によって、副成型金型13の成形面13aに沿ってバリソン15を膨張させながら成形し、成形と同時に充填された液体を密封（封入）する。

【0024】次に、上述の如くブロー成形又は真空成形された容器本体Aの先端部である注液筒部6に有底円錐状の凹部6b及び小径の注液孔6cを形成する三方式の製造方法についてそれぞれ説明する。〔第1方式の製造方法〕図3（イ）～（ニ）に示す第1方式の製造方法では、前記有底円錐状の凹部6bを成形する金属製の凸状成型型20と、前記注液孔6cを形成する金属製の針状

成型型21とを用いる。前記凸状成型型20は、取付け軸20Aの先端部に、有底円錐状の凹部6bを成形する円錐状成形突起20Bと、容器本体Aの注液筒部6の外周面を成形する碗状（釣り鐘状）の成形面20Cとを形成して構成されており、また、前記針状成型型21は、取付け軸21Aの先端部に、小径の注液孔6cを形成する針状成形突起21Bを形成して構成されている。

【0025】そして、この第1方式の製造方法では、図3（イ）に示すように、容器本体Aの先端部である注液筒部6の一部を、温風若しくはハロゲンランプ、レーザー光線等の第1加熱手段Cで室温又は70℃～150℃に加熱する。加熱温度は、容器本体Aの材質、形状にもよるが、容器本体Aの先端が少し軟化する温度が望ましい。容器本体Aの熱可塑性材料が、ポリエチレンのように柔らかい樹脂材料である場合では、加熱しないと先端部が座屈するので、少なくとも前記凸状成型型20で成形される部位を、成形前に第1加熱手段Cで座屈しない温度に加熱する必要がある。しかし、座屈に耐え得る樹脂材料や形状の場合、即ち、凸状成型型20の容器軸線X方向からの押圧に耐え得る場合では、室温でも成形が可能である。

【0026】次に、図3（ロ）に示すように第1加熱手段Cで加熱された容器本体Aの注液筒部6の一部が冷えないうちに、前記凸状成型型20を容器軸線X方向から押し当て、容器本体Aの注液筒部6に、注液口6a側ほど内径が大となる有底円錐状の凹部6bを成形する。このとき、前記凸状成型型20の碗状成形面20Cにより、容器本体Aの注液筒部6の外周面に突出しているブロー成形時のバリを除去することができる。

【0027】前記凸状成型型20自体は、成形される容器本体Aの注液筒部6の形状と肉厚に合わせ、室温から150℃の範囲で温度制御する。加熱温度として注液筒部6の先端の冷却固化を考慮し、できるだけ低い温度が望ましい。この凸状成型型20は、充填される液体の液性に合わせて簡単に交換できるようにする。

【0028】次に、図3（ハ）、（ニ）に示すように、前記容器本体Aの注液筒部6に形成された凹部6bの底面中央位置に対して、針状成型型21を容器軸線X方向から押し当て、胴部2の指先による押圧操作に連れて容器本体Aから押出される液滴量を設定量に制御可能な小径の注液孔6cを形成する。この針状成型型21の針状突起21Bによる注液孔6cの形成工程において、針状突起21Bを室温のままで作業する方法と、針状突起21Bを加熱してから作業する方法が提案される。採用すべき方法は、形成する注液孔6cの形状や凹部6bの形状、されには容器のその他の形状や材質、製造コストなどの条件に応じて選択される。加熱を要する場合の加熱温度としては、針状成型型21の少なくとも針状突起21Bを、容器材質の樹脂が熔融する温度、130℃～180℃の範囲が好適である。

【0029】針状成型型21の加熱は、高周波誘導加熱、ハロゲンランプ、温風等の第2加熱手段Dにより行い、針状成型型21の付根である取付け軸21Aは、ウォータージャケット、圧縮空気等の冷却手段Eで冷却するように構成する。そして、前記針状成型型21が所定温度にまで冷却された時点で、該針状成型型21を所定形状に成形された容器本体Aの注液筒部6から容器軸線X方向に沿って抜き取る。

【0030】前記針状成型型21は、樹脂の剥離性、離型性を良くするため、表面にメッキ若しくはテフロン（登録商標）コーティング、特殊メッキの表面処理を施しても良い。この表面処理は、高温に耐えられ、かつ、簡単に剥離しないものが望ましい。

【0031】[第2方式の製造方法] 図4（イ）～

（ニ）に示す第2方式の製造方法では、第1方式と同様に、前記有底円錐状の凹部6bを成形する金属製の凸状成型型20と前記注液孔6cを形成する金属製の針状成型型21とを用いる。前記凸状成型型20は、取付け軸20Aの先端部に、有底円錐状の凹部6bを成形する円錐状成形突起20Bのみを形成して構成されており、また、前記針状成型型21は、取付け軸21Aの先端部に、小径の注液孔6cを形成する針状成形突起21Bと、容器本体Aの注液筒部6の外周面を成形する碗状（釣り鐘状）の成形面21Cとを形成して構成され、更に、前記針状成形突起21Bの付け根部分21bは、前記円錐状成形突起20Bにて形成された凹部6bに沿う円錐形状に形成されている。

【0032】第1方式では、図3（ロ）に示すように、凸状成型型20による成形時に、容器本体Aの注液筒部6の外周面に突出しているブロー成形時のバリを除去するように構成したが、この第2方式では、図4（ハ）に示すように、針状成型型21による成形時に、容器本体Aの注液筒部6の外周面に突出しているブロー成形時のバリを除去するように構成したものであり、それ以外の構成は、第1方式と同一である。

【0033】[第3方式の製造方法] 図5（イ）～

（ニ）に示す第3方式の製造方法では、前記有底円錐状の凹部6bを成形する凸状成型型と前記注液孔6cを形成する針状成型型とが一体形成されている金属製の単一の成型型22を用いる。この単一成成型型22は、取付け軸22Aの先端部に、有底円錐状の凹部6bを成形する円錐状成形突起22Bと、容器本体Aの注液筒部6の外周面を成形する碗状（釣り鐘状）の成形面22Dとを形成するとともに、前記円錐状成形突起22Bの先端には、小径の注液孔6cを形成する針状成形突起22Cを同心状態で一体形成して構成されている。

【0034】この第3方式の製造方法では、図5

（イ）、（ロ）に示すように、容器本体Aの注液筒部6の先端側を加熱せず、成形された温度（70℃～80℃）のままだ、室温にまで冷えてからでも良く、小径

の注液孔 6 c を形成する針状成形突起 2 2 C を、容器本体 A の注液筒部 6 の先端に対して凹部 6 b を形成する手前まで突き刺す。

【0035】容器本体 A の注液筒部 6 の先端に突き刺された針状成形突起 2 2 C は、図 5 (ハ) に示すように、第 2 加熱手段 D の一例である高周波誘導加熱手段により加熱される。加熱温度は、容器材料が熔融する温度付近が望ましく、通常 120℃～200℃の範囲、好ましくは、160℃付近で制御される。針状成形突起 2 2 C 及び円錐状成形突起 2 2 B を備えた単一成形成型 2 2 は、図 5 (ニ) に示すように、加熱されながら 2 mm から 8 mm 押し込まれ、容器本体 A の注液筒部 6 の先端側を容器軸線 X 方向から圧縮するように加圧しながら有底円錐状の凹部 6 b を成形する。

【0036】この単一成形成型 2 2 の円錐状成形突起 2 2 B の押し込みは深い方が好ましいが、技術的問題から 5～7 mm の範囲とする。この時、熔融した容器本体 A の注液筒部 6 の先端部に気泡が入らないように、単一成形成型 2 2 にガス抜き穴を設けても良い (先端部の樹脂を完全に熔融するので、ガス抜きが必要)。

【0037】単一成形成型 2 2 の付根である取付け軸 2 2 A は、図 11 (イ) に示すように、ウォータージャケット、圧縮空気等の冷却手段 E で冷却するように構成する。そして、前記単一成形成型 2 2 が所定温度にまで冷却された時点で、該単一成形成型 2 2 を所定形状に成形された容器本体 A の注液筒部 6 から容器軸線 X 方向に沿って抜き取る。

【0038】前記単一成形成型 2 2 は、樹脂の剥離性、離型性を良くするため、表面にメッキ若しくはテフロンコーティング、特殊メッキの表面処理を施しても良い。この表面処理は、280℃以上に耐え得ることができ、かつ、簡単に剥離しないものが望ましい。そして、第 1 方式から第 3 方式の何れかの製造方法で成形された容器本体 A の先端部側の有底円錐状の凹部 6 b 及び小径の注液孔 6 c は、中栓としての機能を有する。安定した 1 滴量、一滴の液滴内に気泡がかみ込むことの防止、また気泡の切れを良くすることが挙げられる。また、上述した第 2 方式と第 3 方式においても、針状突起 2 1 B 又は 2 2 C による注液孔 6 c の形成工程において、針状突起 2 1 B 又は 2 2 C を第 2 加熱手段 D によって加熱してから作業していたが、前述したように、場合によってはそのような加熱を行わず、室温状態の針状突起 2 1 B 又は 2 2 C を用いて注液孔 6 c の形成することも可能である。

【0039】次に、前記第 1 方式から第 3 方式の製造方法に用いられる製造機について説明する。図 6～図 11 に示すように、ブロー成形又は真空成形された多数の容器本体 A を一直線状の供給経路に沿って載置搬送する搬送供給手段 F と、該搬送供給手段 F にて載置搬送されてきた容器本体 A を先頭のものから円弧状の送込み経路に沿って搬送する容器送込み手段 G と、この容器送込み手

段 G から送込まれてきた容器本体 A の肩部又はその近くを挟持して、該容器本体 A の水平方向及び少なくとも下方への移動を阻止した状態で円弧状の挟持移送経路に沿って移送する挟持移送手段 H と、該挟持移送手段 H の円弧状挟持移送経路に沿って移送されてくる加工後の容器本体 A を受け取って円弧状の送出し経路に沿って移送する容器送出し手段 J とが設けられている。

【0040】また、前記容器送込み手段 G には、容器本体 A の先端部である注液筒部 6 の一部を加熱する第 1 加熱手段 C が配設されているとともに、前記挟持移送手段 H には、該挟持移送手段 H で挟持移送される容器本体 A の先端部に対して、選択的に付替え自在に装着される凸状成型型 20 又は針状成型型 21 若しくは単一成形成型 22 を待機位置と成形加工位置とに切替え作動させる切替手段 K と、前記挟持移送手段 H の一対の挟持爪で挟持移送される容器本体 A のうち、一対の挟持爪から突出する先端側の部位に対して容器軸線 X 方向から外嵌する状態と離脱させた待機状態とに切替えられる芯出し手段 L とが配設され、更に、前記挟持移送手段 H の円弧状挟持移送経路の途中には、成型型である針状成型型 21 又は単一成形成型 22 を加熱する第 2 加熱手段の一例である高周波誘導加熱手段 D が設けられている。

【0041】前記搬送供給手段 F は、図 6 に示すように、機枠 24 に取付られた搬送フレーム 25 の長手方向両端部に、電動モータ 26 に連動された横軸芯周りで回転自在な駆動スプロケット (図示せず) と、横軸芯周りで回転自在な従動スプロケット (図示せず) とを設け、前記両スプロケットに亘って、多数の容器本体 A を載置搬送する無端搬送体 29 を巻回するとともに、無端搬送体 29 上の容器本体 A を搬送案内する左右一対の搬送ガイド板 30 を設けて構成されている。

【0042】前記容器送込み手段 G は、図 6、図 7 に示すように、電動モータ 33 に連動して縦軸芯周りで駆動回転される駆動回転板 34 の外周縁部に、前記搬送供給手段 F から送出されてくる先頭の容器本体 A が入り込み保持される複数の凹状の保持部 35 を円周方向に沿って一定ピッチで形成するとともに、前記各保持部 35 内に保持された容器本体 A の底部を受け止めて移送案内する載置ガイド板 36 と、前記各保持部 35 内に保持された容器本体 A の回転半径方向外方への抜け出し移動を阻止する移送ガイド 37 とを設けて構成されている。

【0043】前記第 1 加熱手段 C は、前述した第 1 方式及び第二方式の製造時にのみ使用されるものであって、次のように構成されている。即ち、図 6、図 7 に示すように、前記容器送込み手段 G の駆動回転板 34 のうち、各保持部 35 に対応する部位 (当該図面では簡略化して一箇所だけ記載してある) の各々に、該駆動回転板 34 に貫通形成された一対の貫通孔 34 a に沿って上下方向に摺動する一対の昇降ガイド軸 40 a、40 b を備えた昇降枠 40 を、圧縮コイルスプリング 41 にて下降側に

移動付勢した状態で設けるとともに、前記各昇降枠40の上部には、保持部35に保持された容器本体Aの注液筒部6の根元側部分に対して容器軸線X方向から脱着自在に外嵌可能な遮熱板42を取付けてある。

【0044】また、前記各昇降枠40の下部に設けたローラ43の回動移動軌跡に対応位置する機枠24側の支持部材44には、搬送供給手段Fの容器供給位置から挟持移送手段Hへの容器受渡位置に送込み搬送されるとき、前記遮熱板42を容器本体Aの注液筒部6の根元側部分に外嵌させた遮熱作用姿勢に下降させ、かつ、容器受渡位置から容器供給位置に戻し搬送されるとき、前記圧縮コイルスプリング41の弾性復元力に抗して遮熱板42を上方に離間した待機姿勢に上昇させるカム部材45を高き調節自在に取付けてある。

【0045】更に、前記容器送込み手段Gの駆動回転板34のうち、各保持部35に対応する部位の各々には、各保持部35に保持された容器本体Aの先端部である注液筒部6の頂部に対して、200℃～500℃の熱風を供給する熱風供給管46を設けてある。

【0046】前記挟持移送手段Hは、図6、図8、図10に示すように、電動モータ50に連動して縦軸芯周りで駆動回転される駆動回転板51の外周縁部で、かつ、その回転方向に所定間隔を隔てた複数箇所（当該図面では簡略化して一箇所だけ記載してある）の各々に、駆動回転板51の回転軸芯と平行な縦軸芯周りで回動自在な一対の作動軸42を支承し、両作動軸42の上端部には、容器本体Aの環状溝部となる首部3に対して水平方向から嵌合状態で挟持するための半円弧状の挟持面53aを備えた一対の挟持爪43を取付けるとともに、前記両作動軸42には、互いに噛合連動するギヤ54を外嵌固定し、更に、一方の作動軸42の下端部に固着した作動アーム55と駆動回転板51側との間に、前記一対の挟持爪43を開閉作動させる流体シリンダ56を架設してある。

【0047】また、前記両挟持爪43に挟持移送される容器本体Aの底部1を載置状態で摺動案内する載置摺動ガイド板57と、前記両挟持爪43に挟持移送される容器本体Aの回転半径方向外方への抜け出し移動を阻止する移送ガイド部材58とを設けてある。

【0048】そして、前記一対の挟持爪43で容器本体Aの首部3を挟持した状態では、該容器本体Aの水平方向及び少なくとも下方への移動を阻止した状態にあるから、容器本体Aと前記切替手段Kに付替え自在に装着される凸状成型型20又は針状成型型21若しくは単一成型型22との芯合わせ精度が高くなるとともに、成型型の押圧に伴う容器本体Aの容器軸線X方向での弾性変形に起因する有底円錐状の凹部6b及び小径の注液孔6cの加工精度の低下を抑制することができる。

【0049】前記切替手段Kは、図8、図9に示すように、駆動回転板51のうち、各両挟持爪43に対応する

複数箇所（当該図面では簡略化して一箇所だけ記載してある）の各々に、回転半径方向及び上下方向に往復移動される可動枠60を配置し、この可動枠60の先端側取付け部60Aの回転半径方向の二箇所には、下方に向かって開口する軸装着口を備えた二本のホルダ筒軸62を、ナット63を介して脱着自在に取付けるとともに、前記各ホルダ筒軸62の軸装着口には、凸状成型型20の取付け軸20A又は針状成型型21の取付け軸21A若しくは単一成型型22の取付け軸22Aを選択的に付け替え自在に保持するナット61を螺合装着してある。また、前記可動枠60の二本の水平スライド軸60Bを摺動自在に保持する昇降ブロック64には、駆動回転板51に対して昇降自在に摺動する二本の長さの異なる垂直スライド軸65、66を下方に延出し、そのうち、長尺の垂直スライド軸65の下端部を、機枠24に設けられた一対の昇降ガイド軸68に沿って摺動自在な昇降連結体67に連結するとともに、前記昇降連結体67の幅方向中央位置に上下方向から螺合されたネジ軸70を、機枠24に固定された電動モータ69に連動し、更に、前記昇降ブロック64に対して可動枠60を回転半径方向にスライド移動させる流体圧シリンダ71を、前記駆動回転板51に取付けてある。

【0050】前記両ホルダ筒軸62のうち、回転半径方向内方に位置する短尺側の第1ホルダ筒軸62の軸芯は、一対の挟持爪43で挟持された容器本体Aの軸線Xと合致するように構成されていて、回転半径方向内方に位置する長尺側の第2ホルダ筒軸62に選択的に装着された凸状成型型20又は針状成型型21若しくは単一成型型22を成型作動させる場合には、前記流体圧シリンダ71を作動制御して、第2ホルダ筒軸62の軸芯が、一対の挟持爪43で挟持された容器本体Aの軸線Xと合致する位置までスライドさせる。

【0051】また、前記両ホルダ筒軸62に選択的に装着された凸状成型型20又は針状成型型21若しくは単一成型型22を成型作動させる場合には、前記電動モータ69を駆動制御して可動枠60を所定量だけ下降させ、成型型を待機位置から成形加工位置に切替え作動させる。

【0052】前記芯出し手段Lは、図8、図11に示すように、前記垂直スライド軸65、66に沿ってスライド移動自在に外装された可動筒状体75の上部に、一対の挟持爪43で挟持された容器本体Aのネジ筒部5に対して容器軸線X方向から外嵌する嵌合孔76aを形成してある芯出環状体76を取付けるとともに、前記可動筒状体75と機枠24側との間には、前記芯出環状体76を容器本体Aのネジ筒部5に嵌合する芯出し位置と上方に離間させた待機位置とに切替え作動させる流体圧シリンダ77を取付けてある。

【0053】前記両ホルダ筒軸62の各々には、図11（イ）に示すように、冷却手段Eを構成するウォーター

ジャケット 80 が形成されているとともに、前記ウォータージャケット 80 に冷却水を供給する給水接続管 81 と、ウォータージャケット 80 内の冷却水を排出する排水接続管 82 とが設けられている。

【0054】そして、前述の如く、成形と同時に液体が密封状態で充填されている容器本体 A の肩部又はその近くを挟持して、該容器本体 A の水平方向及び少なくとも下方への移動を阻止した状態で経路に沿って移送する挟持移送手段 H と、該挟持移送手段 H で挟持移送される容器本体 A の先端部に対して、前記凹部 6 b を成形する凸状成型型 20 及び前記注液孔 6 c を形成する針状成型型 21 を待機位置と成形加工位置とに切替え作動させる切替手段 K とを設けた場合には、次の作用・効果を奏する。

【0055】即ち、ブロー成形や真空成形等による成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体 A (ボトルパック型の容器本体) を利用して、この容器本体 A の先端部に、先端側ほど内径が大となる有底円錐状の凹部 6 b と、容器本体 A から押出される液滴量を設定量に制御するための小径の注液孔 6 c とを直接形成するが故に、射出成形された中栓部材を用いる開口点眼容器に比して容器本体を製造するための金型が少なく済むとともに、有底円錐状の凹部 6 b と小径の注液孔 6 c との存在により、容器本体 A の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる。

【0056】しかも、前記挟持移送手段 H で挟持移送される容器本体 A の先端部に対して、凸状成型型 20 及び針状成型型 21 を待機位置から成形加工位置に切替え作動させて有底円錐状の凹部 6 b 及び小径の注液孔 6 c を形成する際、容器本体 A の肩部又はその近くを挟持移送手段 H で挟持して、該容器本体 A の水平方向及び少なくとも下方への移動を阻止してあるから、容器本体 A と凸状成型型 20 及び針状成型型 21 との芯合わせ精度が高くなるとともに、容器本体 A の容器軸線 X 方向での弾性変形に起因する有底円錐状の凹部 6 b 及び小径の注液孔 6 c の加工精度の低下を抑制することができる。

【0057】従って、容器本体 A の押圧操作に連れて常に一定量の液体を確実に滴下投与するための有底円錐状の凹部 6 b 及び注液孔 6 c の加工精度の向上を図りながら、ボトルパック型の容器本体 A の持つ利点である製造コストの低廉化をより促進することができる。

【0058】また、前述の如く、前記挟持移送手段 H の挟持爪 53 で挟持移送される容器本体 A のうち、挟持爪 53 から突出する先端側の部位に対して容器軸線 X 方向から外嵌する状態と離脱させた待機状態とに切替えられる芯出し手段 L が設けられている場合には、次の作用・効果を奏する。

【0059】即ち、前記挟持移送手段 H の挟持爪 53 で

挟持された容器本体 A の先端側の部位に対して、容器軸線 X 方向から芯出し手段 L を外嵌させることにより、容器本体 A と凸状成型型 20 及び針状成型型 21 との芯合わせ精度が更に高くなり、容器本体 A の押圧操作に連れて常に一定量の液体を確実に滴下投与するための有底円錐状の凹部 6 b 及び注液孔 6 c の加工精度の向上を促進することができる。

【0060】更に、前述の如く、前記挟持移送手段 H の挟持移送経路の途中に、成型型を加熱する高周波誘導加熱手段 D が設けられている場合には、前記挟持移送手段 H で容器本体 A を連続的に挟持移送しながら、その移送経路途中に設けた高周波誘導加熱手段 D によって、成型型を設定加熱温度にまで急速に過熱することができるから、製造能率及び加工精度の向上を促進しつつ歩留まりの改善をさらに図ることができる。

【図面の簡単な説明】

【図 1】本発明の開口点眼容器を示す断面正面図

【図 2】(イ)～(ニ)は、容器本体のブロー成形又は真空成形による成形工程図

【図 3】(イ)～(ニ)は、第 1 方式による製造方法を示す工程説明図

【図 4】(イ)～(ニ)は、第 2 方式による製造方法を示す工程説明図

【図 5】(イ)～(ニ)は、第 3 方式による製造方法を示す工程説明図

【図 6】開口点眼容器の製造機を示す概略平面図

【図 7】容器送込み手段の拡大断面図

【図 8】挟持移送手段、切替手段、芯出手段の拡大断面図

【図 9】切替手段の要部の拡大図

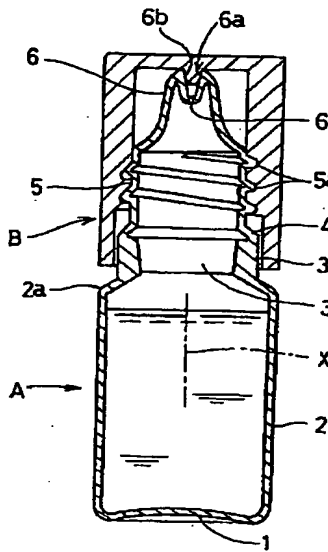
【図 10】挟持爪の駆動系統図

【図 11】(イ)～(ハ)は、第 1 方式による製造工程を示す要部の拡大断面図

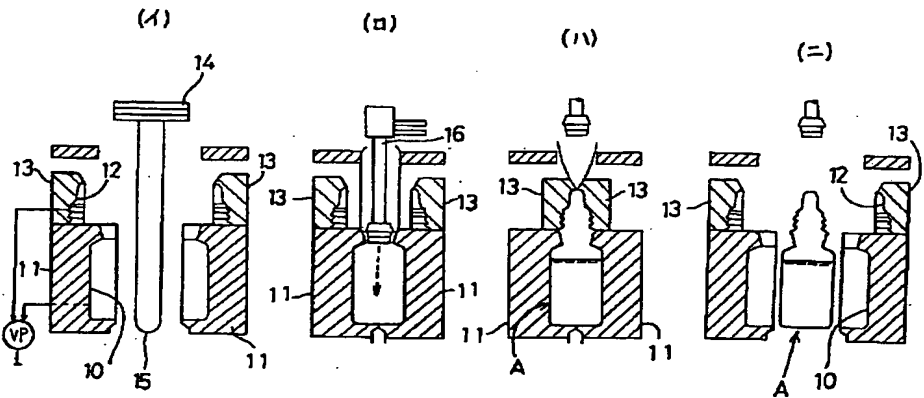
【符号の説明】

A	容器本体
B	キャップ
D	第 2 加熱手段 (高周波誘導加熱手段)
H	挟持移送手段
K	切替手段
L	芯出手段
X	容器軸芯
5 a	ネジ部 (雄ネジ部)
6 b	凹部
6 c	注液孔
20	凸状成型型
21	針状成型型
22	単一成形成型
53	挟持爪

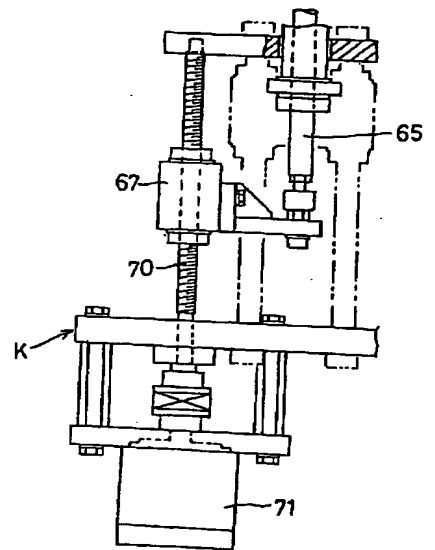
【図 1】



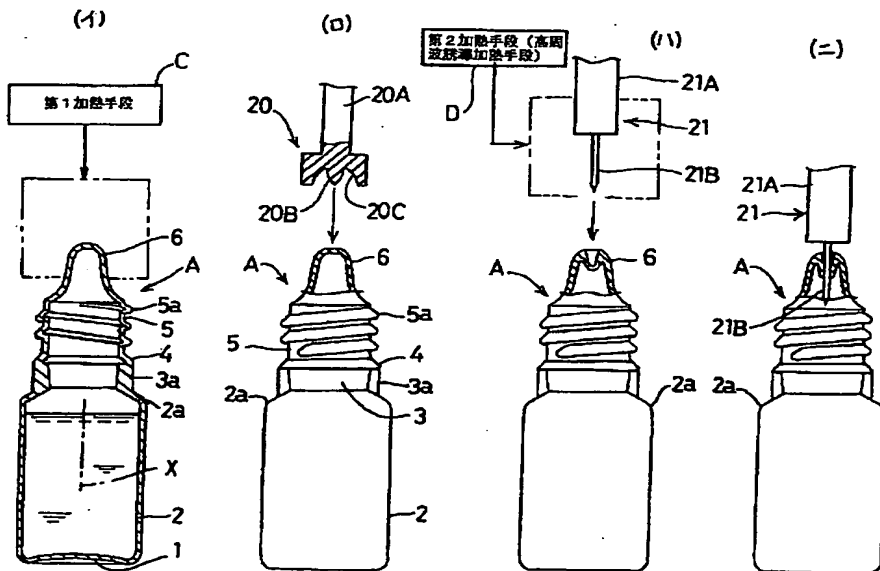
【図 2】



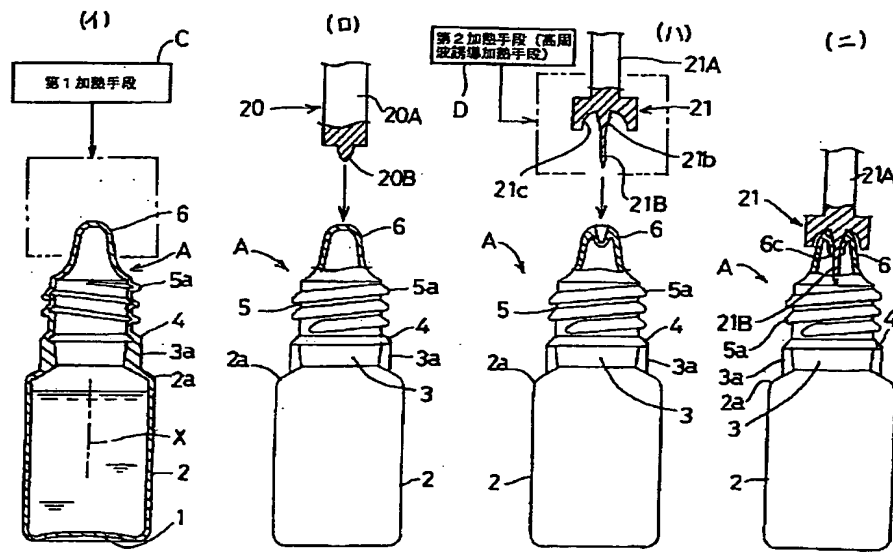
【図 9】



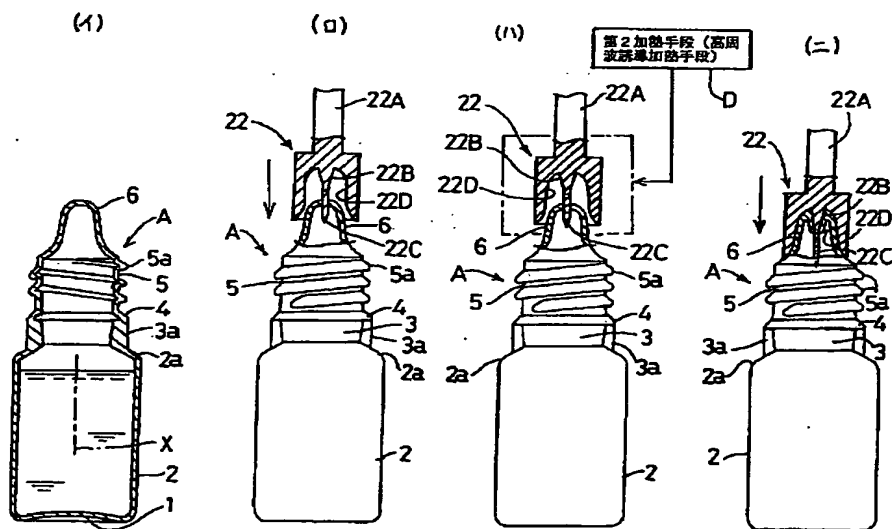
【図 3】



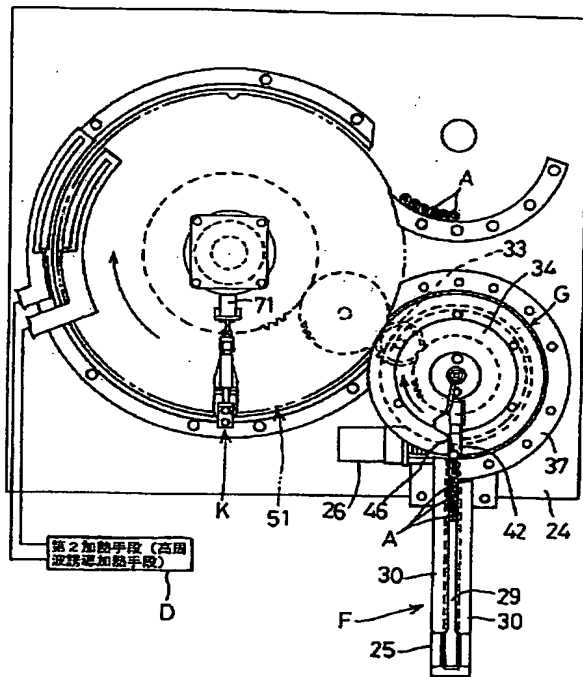
【図 4】



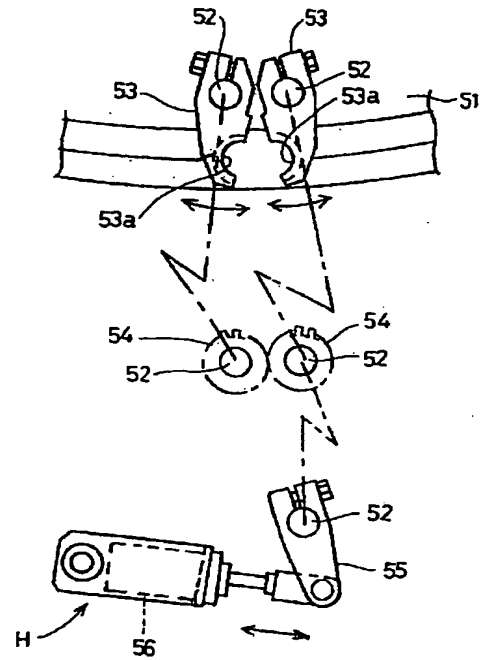
【図 5】



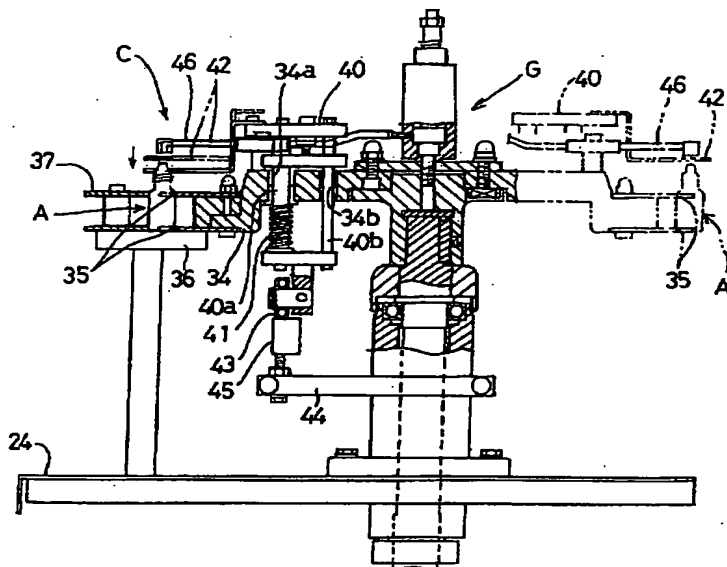
【図 6】



【図 10】



【図 7】



【图 8】

